Claims

1. A system for aligning and synchronizing data between a local and a remote source of data, comprising:

a first sampling system for initially sampling local source data at an original sampling rate;

a receiver at a local source of data for receiving sampled data from a remote source of data;

a transmitter for transmitting sampled local source data to the remote source;

a delay element for delaying the sampled local source data by an amount of time approximately equal to the data transmission delay time between the local and remote sources; and

a resampling system for resampling the delayed local source data and the received data from the remote source at a selected resampling rate, wherein the resulting output is such that the remote data is aligned with the local data at the local source.

2. A system of claim 1, wherein data received from the remote source is initially sampled at said original sampling rate and then is resampled prior to transmission to the local source and wherein the system includes another resampling system for resampling the initially sampled local source data prior to delay thereof.

3. A system of claim 2, wherein said another resampling system has a resampling rate equal to the frame rate for transmitting data from the local source to the remote source, which ensures that no more than one set of data is transmitted to the remote relay at a time.

4. A system of claim 1, wherein said resampling system for the local and remote source data has a sampling rate equal to the original sampling rate.

5. A system of claim 1, including a filter for removing noise from the resampled local and remote source data.

6. A system of claim 1, wherein the resampled local and remote data is usable for differential current analysis in a power line protection system.

7. A system of claim 1, wherein the delay time is determined by determining the round trip data transmission time between the local and remote sources, subtracting the amount of time between receipt of local source data by the remote source and transmission back to the local source and then dividing the result by two.

8. A system of claim 2, including two remote data sources, wherein the local source data from said another resampling system is delayed by the maximum of the two one-way transmission times from the remote sources to the local source, wherein the data from the remote source having the smaller of the two one-way transmission times is delayed by the amount of one-way transmission time difference between the two one-way transmission times, and wherein the delayed local source data, the delayed remote source data and the undelayed remote source data are all resampled by the resampling system.

9. A system for aligning and synchronizing data between a local and a remote source of data, comprising:

a first sampling system for initially sampling local source data at an original sampling rate;

a receiver at the local source for receiving data from a remote source, the data received from the remote source having been initially sampled at the original sampling rate and then resampled at a first resampling rate at the remote source prior to transmission to the local source;

a first resampling system for resampling the initially sampled local source data at said first resampling rate;

a transmitter for transmitting the resampled local source data to the remote source;

a delay element for delaying the resampled data from the local source by an amount of time approximately equal to the data transmission delay time between the local and remote sources; and

a second resampling system for resampling the delayed local source data and the received data from the remote source at a second resampling rate, wherein the resulting output is such that the remote data is aligned with the local data at the local source.

10.   A system of claim 9, wherein the first resampling rate is equal to the frame rate for transmitting data from the local source to the remote source, which ensures that no more than one set of sampled data is transmitted to the remote relay at a time.

11.   A system of claim 9, wherein the second resampling rate is equal to the original sampling rate.

12.   A method for aligning and synchronizing data between a local and a remote source of data, comprising the steps of:

initially sampling local source data at an original sampling rate;

receiving sampled data from a remote source of data;

transmitting sampled local source data to the remote source;

delaying the sampled local source data by an amount of time approximately equal to the data transmission delay time between the local and remote sources; and

resampling the delayed local source data and the received data from the remote source at a selected resampling rate, wherein the resulting output is such that the remote data is aligned with the local data at the local source.

13.   A method of claim 12, wherein data received from the remote source is initially sampled at said original sampling rate and then is resampled prior to transmission to the local source and wherein the method includes the additional step of resampling the initially sampled local source data prior to delay thereof.

14. A method of claim 12, wherein the additional step of resampling has a rate equal to the frame rate for transmitting data from the local source to the remote source, which ensures that no more than one set of data is transmitted to the remote relay at a time.

15. A method of claim 12, wherein the resampling of the local and remote source data has a sampling rate equal to the original sampling rate.

16. A method of claim 12, including a filter for removing noise from the resampled local and remote source data.

17. A method of claim 12, wherein the resampled local and remote data is usable for differential current analysis in a power line protection system.

18. A method of claim 12, wherein the delay time is determined by determining the round trip data transmission time between the local and remote sources, subtracting the amount of time between receipt of local source data by the remote source and transmission back to the local source and then dividing the result by two.

19. A method of claim 13, for use with two remote data sources, wherein the local source data from said another resampling system is delayed by the maximum of the two one-way transmission times from the remote sources to the local source, wherein the data from the remote source having the smaller of the two one-way transmission times is delayed by the amount of one-way transmission time difference between the two one-way transmission times, and wherein the delayed local source data, the delayed remote source data and the undelayed remote source data are all resampled by the resampling system.